

Human Influences on Local and Global Environments

Overview

Students will explore how the consumption of fossil fuels through the manufacturing of everyday products impacts local ecosystems and global environmental change. Students will also explore a case of human influences and genetic mutation impacting natural selection. Finally, they will repair common items and draft a hypothetical repair-reuse campaign to educate the public on the science behind the environmental impact that manufacturing with fossil fuels can have and the importance of repairing our possessions.

Objectives

1. Students will discuss the value of repair and the importance of making products repairable and recyclable.
2. Students will be able to identify sources of eutrophication and other environmental changes related to fossil fuel consumption.
3. Students will be able to describe how human influences combined with genetic mutations can illustrate natural selection.

Possible Standards of Learning

Life Science:

LS.10c. Eutrophication, climate changes, and catastrophic disturbances.

LS.13c. How environmental influences, as well as genetic variation, can lead to diversity of organisms.

Next Generation Science Standards

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Materials

Human influences presentation

iFixit Toolkits

Items for taking apart

Pencils and notebooks for recording observations and drafting the flyer



Safety

Students should wear appropriate safety attire including safety glasses. If at any point a student feels unsafe, they should stop and ask for help from an instructor.

(https://www.iFixit.com/Info/Device_Safety)

Procedure (50 min)

1. Through a handout or presentation, students will explore evolution and human influences on environmental change and the peppered moth case study with their instructors.
 - a. Example of the peppered moth mutation allowing camouflaged moths to survive and reproduce in the pollution of the Industrial Revolution.
 - b. The impact of fossil fuel consumption and the production of NOx on local and global environmental change; the impact of eutrophication on local ecosystems (e.g. algal growth); the importance of repair, reuse, and recycling.
2. Facilitators will introduce the iFixit toolkits and safety procedures based on the manual provided.
3. In small groups, students will repair common objects normally thought to be discarded when broken (e.g. a small desk fan or office chair). Facilitators will prompt students to guess the manufacturing practices that went into making the products and the potential environmental impact.
4. Facilitators will lead a discussion of the importance of repairing before discarding rather than buying a new product right away.
5. Briefly, students will draft a flyer for a hypothetical campaign promoting repair. Students will be asked to make the connection between manufacturing and environmental impact clear in their design.

Differentiation/Variation

Students who finish taking apart items more quickly than others can create a more in-depth repair campaign. The campaign does not have to take the form of a flyer but can also be a short video or work of art. Facilitators can physically assist some groups in taking apart items.

References

Portions of this lesson were adapted from “Repair and Recycle Campaign” retrieved from

http://k12.iFixit.com/c/Repair_and_Recycle_Campaign

Information about the peppered moth retrieved from <https://askabiologist.asu.edu/peppered-moth>

